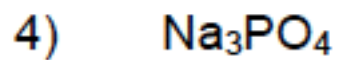
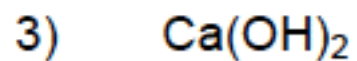
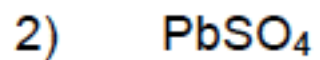
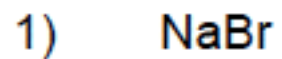


Unit Objective: Be able to use Molar mass to calculate the relationship between moles and grams

Find the molar masses of the following compounds:



Unit Objective: Be able to use Mole Ratios in a balanced equation to relate moles of different substances

2. a. Write and balance the equation for the double replacement reaction of aluminum chloride and lithium sulfate.

b. What is the mole ratio of aluminum chloride to aluminum sulfate?

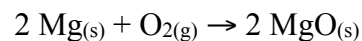
c. What is the mole ratio of aluminum chloride to lithium sulfate?

d. How many moles of aluminum sulfate are produced in a complete reaction of 0.367 moles of lithium sulfate?

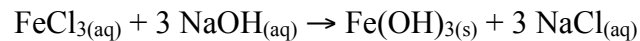
e. How many moles of lithium sulfate are used up when 1.89 moles of lithium chloride react?

Unit Objective: Be able to use the factor-label-method to perform theoretical yield calculation

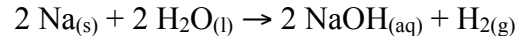
1. Calculate the mass of magnesium oxide formed when 0.52 g of magnesium is burned according to the following equation:



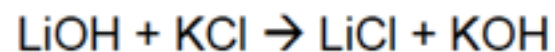
2. Determine the mass of iron(III) hydroxide which should precipitate when a solution containing 3.00 g of iron(III) chloride reacts with an excess of sodium hydroxide.



3. Calculate the mass of hydrogen gas that will be released when 3.0 g of sodium reacts with water.



Unit Objective: Be able to Calculate a percent yield by comparing a theoretical yield to an actual yield



a) I began this reaction with 20 grams of lithium hydroxide. What is my theoretical yield of lithium chloride?

b) I actually produced 6 grams of lithium chloride. What is my percent yield?

Unit Objective: Be able to determine which of two reactants is a limiting reactant

1. Consider the following reaction: $2 \text{Al} + 6 \text{HBr} \rightarrow 2 \text{AlBr}_3 + 3 \text{H}_2$
 - a. When 3.22 moles of Al reacts with 4.96 moles of HBr, how many moles of H_2 are formed?
 - b. What is the limiting reactant?
 - c. For the reactant in excess, how many moles are left over at the end of the reaction?

2. Consider the following reaction: $3 \text{Si} + 2 \text{N}_2 \rightarrow \text{Si}_3\text{N}_4$
 - a. When 21.44 moles of Si reacts with 17.62 moles of N_2 , how many moles of Si_3N_4 are formed?
 - b. What is the limiting reactant?
 - c. For the reactant in excess, how many moles are left over at the end of the reaction?

Objective #1:

- 1) 102.9 g/mol
- 2) 303.3 g/mol
- 3) 74.1 g/mol
- 4) 164.0 g/mol
- 5) 96.0 g/mol

Objective #2:

- a. $2\text{AlCl}_3 + 3\text{Li}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + 6\text{LiCl}$
- b. 2:1
- c. 2:3
- d. 0.12 mol $\text{Al}_2(\text{SO}_4)_3$ (0.367 \times 1/3)
- e. 0.95 mol Li_2SO_4 (1.89 \times 3/6)

Objective #3:

Answers: (1) 0.86 g (2) 1.98 g (3) 0.13 g

Objective #4:

a. $20\text{g LiOH} \times (42.39\text{ gLiCl} / 23.95\text{ gLiOH}) = 35.4\text{ g}$

b. Actual/ Theoretical $\times 100 = \%$

$$(6\text{g} / 35.4\text{g}) \times 100 = 16.9\%$$

Objective #5

1. Consider the following reaction: $2\text{Al} + 6\text{HBr} \rightarrow 2\text{AlBr}_3 + 3\text{H}_2$
 - a. When 3.22 moles of Al reacts with 4.96 moles of HBr, how many moles of H_2 are formed? **2.48 mol H_2**
 - b. What is the limiting reactant? **HBr**
 - c. For the reactant in excess, how many moles are left over at the end of the reaction? **1.57 mol Al**
$$3.22\text{ mol Al} \times (3\text{ mol H}_2 / 2\text{ mol Al}) = 4.83\text{ mol H}_2$$

$$4.96\text{ mol HBr} \times (3\text{ mol H}_2 / 6\text{ mol HBr}) = 2.48\text{ mol H}_2$$

$$2.48\text{ mol H}_2 \times (2\text{ mol Al} / 3\text{ mol H}_2) = 1.65\text{ mol Al used up}$$

3.22 mol Al	
<u>-1.65 mol Al</u>	
1.57 mol Al	
2. Consider the following reaction: $3\text{Si} + 2\text{N}_2 \rightarrow \text{Si}_3\text{N}_4$
 - a. When 21.44 moles of Si reacts with 17.62 moles of N_2 , how many moles of Si_3N_4 are formed? **7.147 mol Si_3N_4**
 - b. What is the limiting reactant? **Si**
 - c. For the reactant in excess, how many moles are left over at the end of the reaction? **3.33 mol N_2**
$$21.44\text{ mol Si} \times (1\text{ mol Si}_3\text{N}_4 / 3\text{ mol Si}) = 7.147\text{ mol Si}_3\text{N}_4$$

$$17.62\text{ mol N}_2 \times (1\text{ mol Si}_3\text{N}_4 / 2\text{ mol N}_2) = 8.810\text{ mol Si}_3\text{N}_4$$

$$7.147\text{ mol Si}_3\text{N}_4 \times (2\text{ mol N}_2 / 1\text{ mol Si}_3\text{N}_4) = 14.29\text{ mol N}_2$$

21.44 mol N_2	
<u>-14.29 mol N_2</u>	
3.33 mol N_2	